**Agency: Commerce, Community and Economic Development**

**Grants to Municipalities (AS 37.05.315)**

**Grant Recipient: Galena**

**Project Title:** **Project Type:** Remodel, Reconstruction and Upgrades

# Galena - School District Central Steam Plant Up-Grade, Water Truck, and Generator Upgrade

**State Funding Requested: $**990,000 **House District:** 6 / C

One-Time Need

**Brief Project Description:**

This will automate boiler controls and operations to save fuel and manpower along with emergency power serving five school buildings

**Funding Plan:**

**Total Cost of Project:** $1,250,000

| | Funding Secured | | Other Pending Requests | | Anticipated Future Need | |
|---|---|---|---|---|---|---|
| | *Amount* | *FY* | *Amount* | *FY* | *Amount* | *FY* |
| State Funds | $260,000 | 2009 | | | | |
| Total | $260,000 | | | | | |

**Detailed Project Description and Justification:**

The steam plant provides the primary source of thermal energy(heating and domestic hot water)for GILA facilities. It is also a major operating cost for the school district. The project is presented in three phases: 1) Automatic Controls for steam boilers,associated other systems, and remote monitoring $430,000; 2) Upgrades to Auxiliary Systems, $162,150; 3)Upgrade Plant Fire Protection Systems, $584,000. Total project cost $1250000. The school district has $260,000 which was reappropriated last year to apply to this system up-grade. Engineers estimate the upgrade work will save approximately $106,715 annually in energy savings, and may save approximately $50,000 annually in labor costs, by enabling part-time unattended operation. If realized, the total cost of the upgrades achieves a simple payback in 11 years. This is an energy conservation project.

**Project Timeline:**

The school district would like to bid the project the spring of 2010 and see the work done this summer.

**Entity Responsible for the Ongoing Operation and Maintenance of this Project:**

Galena City School District



**Contact Name:** Kimberly
**Contact Number:** X3473

*For use by Co-chair Staff Only:*

$990,000 Approved

5:37 PM 5/4/2010

## Grant Recipient Contact Information:

| | |
|---|---|
| Name: | Superintendent James Smith |
| Address: | Box 299 |
| | Galena, AK 99741 |
| Phone Number: | (907)656-1883 |
| Email: | jims@galenanet.com |

Has this project been through a public review process at the local level and is it a community priority? [X] Yes [ ] No



**Contact Name:** Kimberly
**Contact Number:** X3473

*For use by Co-chair Staff Only:*

5:37 PM 5/4/2010

## Galena School/ City Steam Plant

Question: How is it both the School and the City? The city operates it to support seven school buildings on the site. The school pays the utilities.

| | | |
|---|---|---|
| School Buildings: | Automotive Technology Lab | 6,720 Sq. Ft. |
| | Composite Classrooms Building | 17,680 Sq. Ft. |
| | Health / Physical Education Building | 15,610 Sq. Ft. |
| | Head Quarters Classrooms Building | 12,000 Sq. Ft. |
| | Two Seasons Dining Hall & Culinary Arts | 10,662 Sq. Ft. |
| | Ptarmigan Student Residential Hall | 58,494 Sq. Ft. |
| | Iditarod Hall Planned Classroom Expansion | 32,774 Sq. Ft. |

Total Educational Sq. Feet served by the Steam Plant .....169,439 Sq. Ft.

FY10 Fuel consumption.....213,846 gallons

**Engineering Projected efficiency gain... 18%**

Yearly fuel savings.....38,492 gallons

Fuel/labor cost factor .....$4.0713 per gallon FY10

**Project Gain per year.....$156,714 at current fuel costs...**

| | |
|---|---|
| **Total Project Cost** | **$1,250,000** |
| **District Match** | **260,000** |
| **SB 230 Central Steam Plant Appropriation** | **990,000** |


# GALENA CITY SCHOOL DISTRICT
# DRAFT

# CENTRAL POWER PLANT AUTOMATION

# FEBRUARY 2010

*Prepared for:*

GILA
Galena Interior Learning Academy

Galena City School District
Galena, Alaska 99741

*Prepared by:*

PDC INC. ENGINEERS

PDC Inc. Engineers
2700 Gambell Street, Suite 500
Anchorage, Alaska 99503

# Table of Contents



**Appendices:**

# GILA CENTRAL PLANT AUTOMATION

## UPGRADE RECOMMENDATIONS AND CONCEPT DESIGN

## I. EXECUTIVE SUMMARY

The Galena Interior Learning Academy is a secondary educational institution located at Galena, on the former site of the US Air Force Station Galena. The Academy has integrated several of the existing Galena AFS facilities into its campus structure.

The GILA facilities are also served by the existing Galena AFS infrastructure, now operated by the City of Galena, including the Central Steam Plant (Building #1499) and associate utilidor system.

The Steam Plant is critical to GILA. It provides the primary source of thermal energy (heating and domestic hot water) for the GILA facilities. The Steam Plant is also a major operating cost for GILA. Plant operating and maintenance costs are passed through to GILA in the form of energy rates. It is in the best interest of GILA to ensure the Steam Plant remains highly reliable. In addition, any opportunity to improve the efficiency of the Plant and reduce operating and maintenance costs impacts GILA's operating cost directly.

This Study documents the existing Steam Plant systems and recommends upgrades which will reduce Plant operating costs, while improving reliability and efficiency as well. The Study recommends a number of upgrades, including:

- Automatic Controls for Steam Boilers and Associated Auxiliary Systems
- Upgrades to Auxiliary Systems
- Installation of Systems to Enable Remote Monitoring
- Upgrades to Plant Fire Protection Systems

The Study includes a Concept Design and Engineer's Cost Estimate for the recommended upgrades. The total cost of the upgrades is on the order of $1,250,000. A suggested phasing and prioritization of the upgrade work is included, should that be necessary.

It is estimated the upgrade work will save approximately $106,715 annually in energy savings, and my save approximately $50,000 annually in labor costs, by enabling part-time unattended operation. If realized, the total cost of upgrades achieves a simple payback of 11 years.

# II. INTRODUCTION

The Galena Interior Learning Academy is a successful and growing statewide secondary educational institution. It is located in central Interior Alaska in the hub community of Galena and provides educational opportunities for students around the state.

The Galena Interior Learning Academy campus is located on the former site of the US Galena Air Force Station adjacent to the City of Galena. The Galena AFS has been inactive since the mid 1990's. Through the Base Realignment and Closure (BRAC) process, the AFS facilities and infrastructure have been conveyed to the City of Galena.

The Galena Interior Learning Academy has effectively and successfully incorporated several of the existing Galena AFS facilities into their campus structure. These facilities are served by the existing Galena AFS infrastructure, including the Central Steam Plant and associated utilidor distribution system.

Historically, the steam plant was operated by the Air Force. While aged, the facility was well maintained. The plant is clean and appears well cared for. The steam plant is now operated by the City of Galena and serves the buildings used by GILA.

The Steam Plant is critical to GILA. It provides the primary source of thermal energy (heating and domestic hot water) for the GILA facilities. The Steam Plant is also a major operating cost for GILA. Plant operating and maintenance costs are passed through to GILA in the form of energy rates. It is in the best interest of GILA to ensure the Steam Plant remains highly reliable. In addition, any opportunity to improve the efficiency of the Plant and to reduce operating and maintenance costs directly impacts GILA's operating cost.

Previous consideration had been given to performing limited modifications to the existing Steam Plant to allow some periods of unattended operation. Currently the steam plant is operated manually and manned on a 24/7 basis. The objective of unattended operation would be to reduce the operating cost of the steam plant and to ultimately reduce the utility costs to GILA.

The existing City Power Plant is also manned on a 24/7 basis. During unattended operation of the steam plant, remote monitoring could be provided at the City Power Plant.

In addition to controls and instrumentation to enable automation, the steam plant requires some minimum upgrades to improve reliability of subsystems. Such upgrades will improve the overall reliability of the plant and enable automation and unattended operation at a manageable level of risk.

PDC Engineers, under a term service agreement with Architects Alaska and GILA, was tasked with developing a recommended Concept Design and associated cost estimate for such improvements to the Steam Plant. This document presents a review of the existing facility and

systems, a recommended concept design and associated cost estimate. This document also prioritizes upgrade work to provide flexibility in proceeding relative to funding availability.

The primary objective of the Steam Plant Automation is to reduce operational costs through automation to allow part-time unattended operation. The project achieves several secondary objectives as well:

- Improves reliability
- Improves energy efficiency
- Enhances maintenance operations
- Optimizes use of resources
- Allows future full integration with City Power Plant and perhaps other City utilities

While the character and condition of other elements of the Steam Plant were observed during execution of this project, they are not within the scope and objective of this project and are not further developed. Such components include:

- Steam Plant building structure and envelope
- Existing hazmat potential (including hazardous materials within the building construction, site contamination and below slab contamination). Hazardous materials abatement to the extent required to accomplish proposed upgrades is considered incidental work and is included in cost estimates. All other potential hazmat is not considered.
- Non-boiler related building plumbing systems, floor drains and trench drains.
- Non-boiler related building HVAC systems
- Non-boiler related building electrical systems
- Electrical utility class systems in the attached, adjacent Power Plant. The campus distribution switchgear currently operates unattended. The existing diesel-electric generator is for emergency standby use and is operated manually on an as-needed basis.

# III. BACKGROUND

### Description of Existing Systems and Operations

The existing Steam Plant is co-located with the original base electric Power Plant. The systems are described as follows:

### Building Summary

Building 1499 was significantly remodeled in 1968 as the base's power and steam generator facility. It contained generators/electrical distribution equipment and boilers that could supply the base's needs. The City of Galena has removed most of the generation capability out of the facility, leaving it with a single generator and its boiler operations. This building is the closest to a 24-hour operation within the original base, but this is only during the winter months. Summer operations consist of standard work weeks preparing for the upcoming winter heating season. The original occupancy and construction type are unknown. The building construction is slab-on-grade with wood/metal exterior and wood interior framing.

### Steam Boilers

Within the Steam Plant, steam generation is provided by three each low pressure fire tube steam boilers; Cleaver Brooks CB100X-400Z. Each boiler is rated 16,735 MBH input. The boilers are equipped with air atomizing, full modulating, automatic burners.

As the facility is currently configured, a single boiler can meet the peak heating demand. When operated by the Air Force, the boilers were operated subject to an ADEC Owner Requested Limit (#30/5ORL01).

The boilers were manufactured in 1971, installed in the mid-1970's, and re-tubed in approximately 1998. The boilers have been inspected annually by Hartford Insurance. The last inspection reviewed was dated January, 2007. It indicated overall good condition. Internal inspection showed light scale, no corrosion. The boilers were last hydro-tested in July, 2006, at 35 psi. The boilers were manufactured with a 150 psi MAWP rating, are currently equipped with 35 psi relief valves, and operate at 20 psi. Each boiler is connected to the main steam header with dual isolation valves. Each boiler is equipped with manual bottom and surface blowdown.

Steam is distributed to the campus facilities by way of an utilidor system. Steam distribution is 20 psi. Condensate is returned to the Steam Plant through the utilidor, pumped from the various end use locations. Operators report a high percent condensate return rate (greater than 95%).

### Deaerator and Feedwater

Boiler feedwater is provided by a steam deaerator and boiler feedwater pumps. The deaerator is a Schaub Duo-Pak, steam injection, with duplex recycle pumps. The unit operates at 210F and

is rated for 0.03% O2 concentration. In addition to condensate return, make-up water is piped to the deaerator.

There is one feedwater pump for each boiler. Any pump may be manually valved to feed any boiler.

The deaerator and feedwater pumps have a local control panel. The local control panel cycles respective boiler feed pump and is capable of annunciating high water level, low water level and surge tank low water level. There are no pump failure alarms.

**Water Treatment**

The Steam Plant utilizes water treatment to assure boiler water is maintained at proper conditions. Historically, the plant has practiced an excellent water treatment program. Make-up water to the deaerator is softened. Boiler water chemistry is sampled daily and chemical treatment batch fed at each boiler.

**Fuel Supply**

Fuel supply consists of 2 each 30,000 gallon exterior above ground self-diked operating tanks, which are pipeline filled from bulk fuel storage. The operating tanks are used to fill a boiler inside day tank and multiple generator's inside day tanks. The operating tanks are individually valved and manually selected. The system was upgraded approximately 2003.

The boiler inside day tank is a Simplex packaged unit, 275 gallon, with dike. It has a duplex fuel transfer pump set to transfer fuel from the outside operating tanks. Operations personnel report the day tank transfer pumps loose prime when the operating tanks fall below 4,000 – 5,000 gallons. The day tank transfer pump set is complete with an auto pump alternator and local alarm. The day tank provides approximately 1 hour operating capacity for the boilers.

There were a number of abnormalities noted with the fuel oil system. Both the boiler day tank and the generator day tanks fill piping is interconnected, which complicates fuel operations and there are a number of minor piping deviations.

**Combustion Air**

Combustion air for the boilers consists of outside air openings with manual dampers. They require plant operators to control them. Operating personnel report the combustion air dampers are usually just left in the closed position during the winter.

**HVAC**

The HVAC system serving the steam plant is basic. Heating is provided by low pressure steam unit heaters and heating terminal units, locally controlled. A single constant volume, variable

temperature AHU with mixing box provides general cooling and ventilation air for the steam plant. A local thermostat provides basic temperature control.

**Controls and Instrumentation**

The controls and instrumentation serving the Steam Plant and its systems are aged and elementary. Key elements include:

- Each boiler is locally controlled and independent.
- Deaerator is locally controlled and independent.
- The fuel transfer system is locally controlled and independent.
- The AHU and space heating terminal units (steam) are locally controlled.
- A remote sensing steam pressure sensor is located in the steam plant and displays the steam pressure at some location in the distribution utilidor.
- There is a local master alarm panel that was capable of annunciating at the Fire Station. The local alarms include:
    - boiler flame failure
    - steam main pressure
    - deaerator level

**Fire Protection**

The facility is served by an older Fire Alarm system. There are no fire suppression systems.

Fire detection and alarm system is provided by two separate Monaco Fire Alarm Control Panels (FACP), one covering the Steam Plant and one covering the Electric Plant. Automatic detection coverage in the Steam Plant consists of four ceiling-mounted heat detectors. The office area, switchgear room, hallway, exhaust plenum and generator rooms are protected with heat detectors as well. There are manual pull stations at most egress doors. There is one wall-mounted fire alarm bell in the Steam Plant. There are fire alarm bells mounted in the generator rooms. There are no other notification devices in the facility.

**General Facility Arrangement**

The Steam Plant is co-located with the electric Power Plant. The Steam Plant related functions are generally contained within a single room, which houses the steam boilers and related auxiliaries. There is an Operators Control Room within the boiler room.

Ancillary facility spaces include a break room, office, janitor/toilet room, and hallway.

The electric Power Plant consists of the engine-generator room and a separate switchgear room. The engine-generator room originally contained several engine generator units and provided prime power for the base. Most of the units have now been removed. A single engine generator unit, which is manually started and controlled, can provide emergency back-up power to the campus facilities. The switchgear room contains both generator switchgear and campus

wide distribution equipment. It is the primary service location for power from the City Power Plant.

The overall building structure is a pre-engineered metal building, slab on grade, with corrugated metal siding and roofing. The roof is an unvented, hot pitched roof configuration.

There are floor drains and a floor trench system in the steam plant.

The interior construction of the exterior envelope includes corrugated metal wall panels to approximately 8’ above finished floor. There is exposed batt insulation with vapor barrier facing above that, and on the roof. Interior construction is generally gyp board walls and ceilings, with some areas of suspended ceiling construction.

The overall condition of the building is fair, but very worn. The building does experiences roof eve icing in the winter.

**Mode of Operation**

The Steam Plant is currently operated in a fully attended mode. It is manned 24/7, except the summer months, when the Plant is taken off-line.

The existing electric generating plant is operated in an emergency mode only. It is normally unattended, and off-line. In the event of loss of power from the City Power Plant, the generator may be manually started, brought on line, and used to provide power to the campus facilities. It is attended by an operator when it is on-line.

The switchgear in the electric Power Plant serves as the primary distribution center for the campus facilities. It receives power form the City Power Plant and distributes through feeders to campus facilities. It operates automatically, in an unattended mode.

# IV. UPGRADE RECOMMENDATIONS

Based on the stated objectives and the evaluation of the existing systems, the following upgrade recommendations have been developed:

**Automatic Controls for Steam Boilers and Associated Auxiliary Systems**

Provide automatic controls for monitoring and control of steam boilers and associated auxiliary systems so that the central heat plant may be operated in a normal mode automatically and unattended. Routine daily checks, normally reoccurring preventive maintenance activities and non-reoccurring maintenance and repair activity will continue to be performed using plant personnel.

To enable automatic operation of the steam boilers, the following steam boiler modifications are required:

- Replace burner controls and components
- Provide multi-boiler controller
- Provide motorized boiler stop valves

**Upgrade Auxiliary Systems**

Upgrade auxiliary systems such that auxiliary systems are code compliant, align with applicable industry standards for performance and reliability, and are configured with standby capability such that failure of a single auxiliary system does not take the central heat plant off-line. Upgrades to the auxiliary systems include:

- Monitoring and control of all subsystems. Monitoring and control will enable automatic operation and annunciation of trouble or failure conditions.
- Upgrade of boiler auxiliaries shall insure prime movers and key components are duplexed, with auto start, such that failure of a single key component will not shutdown either the auxiliary system or the boilers.
- Upgrade Fuel Oil system
- Upgrade deaerator and feedwater
- Upgrade combustion air

**Enable Remote Monitoring**

Allow remote monitoring of the steam plant systems at the existing City Power Plant. Upgrade work shall include:

- Provide remote HMI (operator's terminal) at City Power Plant networked with the Steam Plant boilers and auxiliary systems control and monitoring system.
- Provide remote visual monitoring with CCTV system. Remote visual monitoring provides additional capabilities to detect and respond to abnormal conditions.

**Upgrade Plant Fire Protection Systems**

Upgrade Plant fire protection systems to enhance fire safety, especially the ability to detect, alarm and extinguish incipient fires in an unattended mode. Upgrades to the fire protection systems include:

- Replace Fire Alarm system
- Provide enhanced fire detection, including Flame Detection
- Retrofit steam plant with fire sprinklers
- Provide enhanced fire suppression, including water-mist fire protection system

**Items Not Included In Upgrade Recommendations**

A number of issues and items were considered but ultimately not included in the proposed upgrade recommendations. They may be worthy of future consideration, but they do not materially affect the objective of implementing unattended automated operation of the Steam Plant.

- Incorporate monitoring of the existing distribution utilidor and mechanical and electrical systems in other GILA facilities. While not accomplished now, the Steam Plant monitoring and control system could accommodate such additional functions in the future.
- Expanded monitoring and control of the City Power Plant auxiliary systems. To a great extent, the existing City Power Plant auxiliary systems would benefit from enhanced monitoring and control. While not associated with this scope of work, the new Steam Plant control and monitoring system will be compatible with and capable of integrating the City Power Plant.
- Modify the existing emergency diesel-electric generating system for automatic start, dispatch and operation. The existing generator is capable of meeting the campus wide electrical requirements in an emergency mode, and is also capable of providing emergency power to the Steam Plant.
- Upgrade of the Steam Plant structure, envelope and interior construction. The steam plant has been well maintained. It is however an aging structure. There may be benefits in upgrades to improve efficiency, improve cold regions performance, reduce seismic risk, and prolong the useful life.

# V. CONCEPT DESIGN

The following defines the concept design for the recommended upgrades. Concept drawings and supporting data may be found in the Appendices.

**Automatic Controls for Steam Boilers and Associated Auxiliary Systems**

Upgrade existing boiler burners and controls and provide multi-boiler sequencer. Burner controls and multi-boiler sequencer would be as manufactured by the existing boiler manufacturer.

Upgraded burner controls shall include:

1. PLC based burner control complete with all control and safeties. Enhanced control features shall include oxygen trim and xxxx.
2. VFD drive for burner motor, to enhance electrical energy efficiency.

Multi-boiler controller shall be PLC based and shall provide integrated control of each of the 3 boilers. Multi-boiler control shall be capable of:

1. Lead-lag or parallel modulating operation of boilers to meet system demand.
2. Bring on back-up boiler should lead boiler fail or fail to meet system demand.
3. Maintain off-line boilers in either a hot, warm or cold standby mode.
4. Automatically start and warm-up off-line boilers.
5. Take boilers safely off line and isolate from system should remote system failure be detected (utilidor steam piping failure, etc.).

Boiler control system shall include local HMI and shall allow remote monitoring and control through web based interface. Boiler control system shall include data processing capabilities for creating and storing trend logs for all monitored points, processing alarms, etc.

Provide motorized boiler stop valves in each boiler HPS connection. Motorized valves shall be used to automatically isolate off-line boilers. Operators shall be capable of automatic operation and local, manual override. Valves shall fail in closed position. Valves shall be controlled by boiler/burner control system.

**Upgrade Auxiliary Systems**

Upgrade boiler auxiliary systems to reliably support automatic, unattended operation of existing boilers.

Upgrade existing boiler fuel supply system. Upgrade work shall include:

1. Remove interconnection between boiler fuel system and power plant diesel-electric generator fuel system. Provide new duplex fuel transfer pump set serving generator day

tank. Locate pump in power plant. Modify FOS and FOR piping accordingly. Fuel transfer pump set shall be complete with automatic controls.

2. Modify existing boiler fuel supply day tank piping. Eliminate existing FOR. Provide dual shutoff valves on FOS for overfill protection. Modify day tank normal and emergency relief vents for proper termination on exterior of building. Remove isolation valves on FOR piping. Provide check valves as required for fuel flow control.
3. Provide monitoring of existing fuel system through new Steam plant monitoring and control system. Key points shall include:
    a. Day tank low level
    b. Day tank low-low level alarm
    c. Day tank high level
    d. Day tank high-high level alarm
    e. Transfer pump status (on-off)
    f. Transfer pump lead pump failure alarm
4. Option: Increase capacity of day tank storage for increased response time during unattended operation. Increased capacity is limited to xx gallons. Capacity shall be increased by replacing existing day tank with new packaged system. Use existing fuel transfer pump set to serve Power plant day tank.

Upgrade existing deaerator and boiler feedwater system. Upgrade work shall include:

1. Provide monitoring of deaerator and feedwater pumps through new steam plant monitoring and control system. Key points shall include:
    a. Deaerator low level.
    b. Deaerator low-low level alarm.
    c. Deaerator overflow.
    d. Deaerator fill valve position.
    e. Feedwater pump status (on-off).
    f. Feedwater pump failure alarm.

Upgrade boiler combustion air:

1. Upgrade existing boiler combustion air system. Upgrade work shall include:
    a. Modify existing boiler plant air system to accommodate boiler space cooling and combustion air requirements by the addition of a new supply fan with mixing box, and operation interlocked with boiler firing.
    b. Revise outside air intake and exhaust locations to accommodate new airflows.
    c. Interlock operation of revised air system to operate supply air in conjunction with boiler operation levels.
    d. Provide new relief air opening to facilitate air exiting the space to maintain pressurization.

Provide air monitoring of the space to detect carbon monoxide and other hazardous materials.

**Enable Remote Monitoring**

Provide DDC based monitoring and control system for the Steam Plant. System shall be used to control and/or monitor HVAC, electrical, fire, security systems and other equipment as noted in this document. All equipment provided shall be connected with all functions monitored and, controlled by the DDC. System shall have an operator programmable system to perform closed-loop, modulating control of building equipment. Connect all digital controllers through the new communication network to share common data and report to the workstation computer. Provide workstation DDC software capable of programming and monitoring the digital controllers. The control system shall be capable of downloading programs between the workstation and digital controllers. New software programs shall integrate all existing control systems and devices.

System shall provide the following control and monitoring functions:

1. Monitoring and control for all upgraded auxiliary systems.
2. Monitoring and control for new boiler control system.
3. Replace existing monitoring points that were remoted to the Base Fire Station in the original control system.
4. Local HMI for operator interface. Local HMI shall be capable for data processing, trend logging, alarm processing, etc. Local HMI shall support graphics for ease of interface.
5. Remote monitoring and control access through web-based interface.
6. Remote HMI installed in the City Power Plant control room.

In addition, provide the following special control functions:

1. Space temp alarm in Steam Plant High and low space temp alarms can be used to detect potential freeze-up condition in plant or steam piping leak (high space temp).
2. Liquid detection on low point of Steam Plant floor. Can be used to detect potential pipe leak or tank overflow.
3. Steam pressure and steam flow on steam main to utilidor. Can be used to detect abnormal steam flow or potential steam piping failure in utilidor.

DDC control system shall have the capability to expand to accommodate additional monitoring and control functions, including; other systems within the Steam Plant and Power Plant, other GILA facilities and the City Power Plant.

Option: Provide remote visual monitoring of the Steam Plant primary boiler systems and associated support equipment with a CCTV system. Visual monitoring system shall consist of local CCTV cameras. All cameras will be able to be viewable through remote access software from monitoring and control system HMI located at the Operator's Station in the City Power Plant or other authorized systems.

**Upgrade Plant Fire Protection Systems**

Remove the existing building fire alarm system and replace with new. The new system shall be a multi-zone, supervised fire alarm and detection system with fully addressable devices. The fire alarm system shall be fully compatible with the planned campus standard. It shall include:

- Single control panel, capable of remote reporting
- Automatic detectors, heat or smoke, as appropriate for the space
- Manual pull stations at egress doors
- Notification appliances (horns and strobes)It is highly recommended any upgrade include replacement of the control panel with a single new panel with new detectors.

Option: In addition to the new fire alarm system, provide enhanced detection in the Steam Plant. Enhanced detection consists of IR/UV flame detectors. The system would be focused on potential fuel related fires and would provide advance detection in an unattended condition.

Provide a complete wet pipe sprinkler system throughout the existing Steam Plant and Power Plant. The sprinkler system shall be Ordinary Hazard, Group I. Water supply shall be a 6” service, extended from the existing campus distribution system through the utilidor.

Option: In addition to sprinkler system, provide water mist fire sprinkler system to protect high risk equipment or areas. Water mist may be local application or total flooding. Where total flooding, water mist may substitute for wet pipe sprinklers. Areas to be protected include:

- Switchgear equipment
- Generator and day tank
- Boilers and day tank

Water mist system shall include:

- Detection and control system
- Interface with fire alarm system
- Compressed gas and high pressure pump for atomization

**General Requirements**

All work shall be accomplished in accordance with the following general requirements:

- All work shall be in accordance with applicable codes and standards and good cold regions practices.
- Steam valves shall be flanged or welded, Class 150. Steam piping shall be schedule 40, black steel, welded steel.
- Fuel piping shall be schedule 40, black steel, welded or threaded. All fuel piping specialties shall be UL listed for the application.
- Provide hangers and supports, and equipment bases and supports for all new piping and equipment. Brace and reinforce as required for seismic loads.

- All hot piping shall be insulated. All cold piping and ductwork shall be insulated and have vapor barrier jacket to prevent condensation.
- Fans and air handling units shall be premium quality units, braced and reinforced for operating pressures. Units shall be thermally and acoustically lined. Units shall be complete with mixing boxes, control dampers and filters.
- All motors shall be high efficiency.
- Electrical work shall be in accordance with the NEC. All wiring shall be in conduit.
- Fire alarm and detection system shall be in accordance with NFPA 72 Code Ch5/7
- Fire sprinkler systems shall be in accordance with NFPA 13. Piping shall be schedule 40, black steel minimum. Water mist systems shall be in accordance with NFPA 750.
- Provide hazardous materials abatement to the extent required for new work
- Patch and repair existing systems, surfaces and finishes as required for work under his project.
- Provide complete O&M data and O&M training for all new equipment and systems.
- All new piping, conduit, bracing and supports and equipment shall be painted for protection against corrosion and for finished appearance. Provide tagging of all equipment, instruments, valves and devices. Provide identification coding of all piping.

**Concept Cost and Recommended Prioritization**

A concept level Engineer's Cost Estimate has been developed for the upgrade recommendations. The engineer's estimate is based on the concept design and the following general assumptions:

1. Construction shall occur in 2010.
2. All work shall be accomplished through a single construction contract with a General Contractor.
3. The construction contract shall be procured through a competitive process.
4. The estimate includes a 15% estimator's contingency, based on the level of design development.
5. Vendor's quotes for the boiler control upgrade work.
6. The estimate does not include A-E fees, nor the Owner's administration and other projected related costs.

The total estimated construction cost for the recommended upgrades is $1,250,000 A breakdown of the costs may be found in the Appendices.

It may be possible to accomplish the work in phases as construction funding becomes available. We have developed the following recommended phasing and prioritization:

1. Automatic Boiler Controls, Upgrade Auxiliary Systems and Enable Remote Monitoring. This level of work would enable the Plant to operate unattended, and remotely monitored from the City Power Plant.
    a. Total Cost: $430,000

2. Additional Boiler operation systems:
    a. Total Cost Auxiliary Boiler Systems: $15,000
    b. Total Cost Boiler Combustion Air: $25,300
    c. Total Cost Day Tank Capacity: $12,650
    d. Total Cost Remote monitoring, non boiler systems: $162,150

3. Upgrade Plant Fire Protection Systems. Replacing the fire alarm system and adding basic fire sprinkler system reduces the risk of fire loss in the facility.
    a. Total Cost: $400,000

4. Incorporate Optional Features: Optional features include expanded day tank capacity, CCTV monitoring, enhanced fire diction and enhanced fire suppression. The optional items further reduce risk associated with unattended operation.
    a. Total Cost, CCTV: $ 18,400
    b. Total Cost, Enhanced Fire Systems: $184,000

## Appendix A - Concept Drawings / PFDs

Sketches In process

# Appendix B - Cost Estimate

# GILA STEAM PLANT COST ESTIMATE PACKAGE

2/1/2010

\\pdcserv03\Projects\2009\A09015.08\5Rprts\[GILA COST ESTIMATE PACKAGE.xls]GILA COST EST

| | Item | qty | units | Unit Cost | Subtotal | Remarks |
|---|---|---|---|---|---|---|
| | Automatic Controls for Steam Boilers | | | | | |
| 1 | PLC based burner controls - CB Hawk ICS system | 1 | Set | $292,000 | $292,000 | Appen-C, 12/9/09 value |
| 2 | O2 Trin, Parallel Positioning, Burner motor VFD drive, for 3 boilers | 1 | Set | | $0 | Included in above |
| 3 | Multi-boiler master controller | 1 | Ea. | | $0 | Included in above |
| 4 | Motorized stop valves - high performance butterfly valves, for 3 boilers | 1 | Set | | $0 | Included in above |
| 5 | Hazmat allowance | 1 | Lot | $3,000 | $3,000 | Not discussed in quote - added item |
| 6 | Electrical Support | 1 | man-wk | $4,000 | $4,000 | electrical instalation, materials, wiring |
| 7 | | | | | | |
| 8 | Subtotal | | | | $299,000 | |
| 9 | Contingency | | | | $44,850 | +15%*Subtotal |
| 10 | Subtotal | | | | $343,850 | BaseSubtotal+Contingency |
| 11 | General Conditions, OH&P | | | | $85,963 | +0.25% Contractor |
| 12 | Total | | | | **$429,813** | |
| 13 | | | | | | |
| 14 | | | | | | |
| 15 | Upgrade Auxiliary Systems | | | | | |
| 16 | Upgrade existing boiler fuel supply | | | | | |
| 17 | Separate fill piping for generator day tank | 1 | Lot | | $1,000 | |
| 18 | Transfer pumps for generator day tank | 1 | Set | | $2,000 | |
| 19 | Modify day tank piping | 1 | Lot | | $500 | |
| 20 | Monitorng & control (under Remote Monitoring) | 1 | Lot | | $1,000 | |
| 21 | | | | | | |
| 22 | Upgrade existing dearator and boiler feedwater | | | | | |
| 23 | Monitorng & control (under Remote Monitoring) | | | | $2,000 | |
| 24 | | | | | | |
| 25 | Subtotal | | | | $6,500 | |
| 26 | Contingency | | | | $975 | +15%*Subtotal |
| 27 | Subtotal | | | | $7,475 | BaseSubtotal+Contingency |
| 28 | General Conditions, OH&P | | | | $7,475 | +0.25% Contractor, +0.75% Regional |
| 29 | Total | | | | **$14,950** | |
| 30 | | | | | | |
| 31 | | | | | | |
| 32 | Upgrade Boiler Combustion Air | | | | | |

# GILA STEAM PLANT COST ESTIMATE PACKAGE

2/1/2010
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| | Item | qty | units | Unit Cost | Subtotal | Remarks |
|---|---|---|---|---|---|---|
| 33 | Demo Existing materials as necessary | 1 | Lot | $2,000 | $2,000 | |
| 34 | New Supply Fan with filters, mixingbox, intake louvers | 1 | Ea | $5,000 | $5,000 | |
| 35 | New Relief / Exhaust air openings | 1 | Ea | $1,000 | $1,000 | |
| 36 | New Interlocked control system with boiler operation | 1 | Ea | $3,000 | $3,000 | |
| 37 | | | | | | |
| 38 | Subtotal | | | | $11,000 | |
| 39 | Contingency | | | | $1,650 | +15%*Subtotal |
| 40 | Subtotal | | | | $12,650 | BaseSubtotal+Contingency |
| 41 | General Conditions, OH&P | | | | $12,650 | +0.25% Contractor, +0.75% Regional |
| 42 | Total | | | | **$25,300** | |
| 43 | | | | | | |
| 44 | | | | | | |
| 45 | Increase Day Tank Capacity | | | | | |
| 46 | Remove Existing day tank | 1 | Lot | $500 | $500 | Remove (E) 275 gal tank, related piping |
| 47 | New Day tank, options, piping, connections | 1 | Ea | $4,000 | $4,000 | |
| 48 | Controls, alarms, connections | 1 | Lot | $1,000 | $1,000 | |
| 49 | | | | | | |
| 50 | Subtotal | | | | $5,500 | |
| 51 | Contingency | | | | $825 | +15%*Subtotal |
| 52 | Subtotal | | | | $6,325 | BaseSubtotal+Contingency |
| 53 | General Conditions, OH&P | | | | $6,325 | +0.25% Contractor, +0.75% Regional |
| 54 | Total | | | | **$12,650** | |
| 55 | | | | | | |
| 56 | | | | | | |
| 57 | Enable Remote Monitoring | | | | | |
| 58 | Plant DDC system | 1 | Lot | $10,000 | $10,000 | |
| 59 | Plant HMI | 1 | Lot | $7,500 | $7,500 | |
| 60 | Monitor Boiler Control | 1 | Lot | $5,000 | $5,000 | |
| 61 | Day Tank M&C | 1 | Lot | $8,000 | $8,000 | |
| 62 | Dearator/Feedwater M&C | 1 | Lot | $10,000 | $10,000 | |
| 63 | Combustion Air M&C | 1 | Ea | $15,000 | $15,000 | |
| 64 | Existing Plant M&C | 1 | Lot | $5,000 | $5,000 | |
| 65 | Web interface | 1 | Lot | $2,500 | $2,500 | |

# GILA STEAM PLANT COST ESTIMATE PACKAGE

2/1/2010
\\pdcserv03\Projects\2009\A09015.08\5Rprts\[GILA COST ESTIMATE PACKAGE.xls]GILA COST EST

| | Item | qty | units | Unit Cost | Subtotal | Remarks |
|---|---|---|---|---|---|---|
| 66 | City PP HMI | 1 | Lot | $7,500 | $7,500 | |
| 67 | | | | | | |
| 68 | Subtotal | | | | $70,500 | |
| 69 | Contingency | | | | $10,575 | +15%*Subtotal |
| 70 | Subtotal | | | | $81,075 | BaseSubtotal+Contingency |
| 71 | General Conditions, OH&P | | | | $81,075 | +0.25% Contractor, +0.75% Regional |
| 72 | Total | | | | **$162,150** | |
| 73 | | | | | | |
| 74 | | | | | | |
| 75 | CCTV monitoring of Steam Plant | | | | | |
| 76 | CCTV system | 1 | Lot | $5,000 | $5,000 | (3) cameras at 1k each, 2k in connections |
| 77 | DDC/HMI interface | 1 | Lot | $3,000 | $3,000 | Connections, software, etc |
| 78 | | | | | | |
| 79 | Subtotal | | | | $8,000 | |
| 80 | Contingency | | | | $1,200 | +15%*Subtotal |
| 81 | Subtotal | | | | $9,200 | BaseSubtotal+Contingency |
| 82 | General Conditions, OH&P | | | | $9,200 | +0.25% Contractor, +0.75% Regional |
| 83 | Total | | | | **$18,400** | |
| 84 | | | | | | |
| 85 | | | | | | |
| 86 | Upgrade Plant Fire Protection Systems | | | | | |
| 87 | New Fire Alarm System | 8121 | $/SQFT | $10 | $81,210 | 8,121 sqft |
| 88 | New Fire Sprinkler System | 8121 | $/SQFT | $10 | $81,210 | 8,121 sqft, $20/sqft |
| 89 | Water service | 1 | EA | $10,000 | $10,000 | |
| 90 | | | | | | |
| 91 | Subtotal | | | | $172,420 | |
| 92 | Contingency | | | | $25,863 | +15%*Subtotal |
| 93 | Subtotal | | | | $198,283 | BaseSubtotal+Contingency |
| 94 | General Conditions, OH&P | | | | $198,283 | +0.25% Contractor, +0.75% Regional |
| 95 | Total | | | | **$396,566** | |
| 96 | | | | | | |
| 97 | | | | | | |
| 98 | Enahnced fire systems in Steam Plant - 8121 sqft | | | | | |

# GILA STEAM PLANT COST ESTIMATE PACKAGE

2/1/2010
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| | Item | qty | units | Unit Cost | Subtotal | Remarks |
|---|---|---|---|---|---|---|
| 99 | Water mist system in Steam Plant (2,700sqft) | 1 | Lot | $24,000 | $24,000 | |
| 100 | Water mist system in Switchgear room (2,700sqft) | 1 | Lot | $24,000 | $24,000 | |
| 101 | Water mist system in Generator room (2,700sqft) | 1 | Lot | $24,000 | $24,000 | |
| 102 | Water mist detection and control | 1 | Lot | $8,000 | $8,000 | (2) flame detectors at 2.5k ea+3k other elec |
| 103 | | | | | | |
| 104 | Subtotal | | | | $80,000 | |
| 105 | Contingency | | | | $12,000 | +15%*Subtotal |
| 106 | Subtotal | | | | $92,000 | BaseSubtotal+Contingency |
| 107 | General Conditions, OH&P | | | | $92,000 | +0.25% Contractor, +0.75% Regional |
| 108 | Total | | | | **$184,000** | |
| 109 | | | | | | |
| **110** | **GRAND TOTAL** | | | | **$1,243,829** | |

# Appendix C - Vendor quotes

## Matt Leistico

**From:** Russel West [RWest@coleindust.com]
**Sent:** Wednesday, January 20, 2010 4:29 PM
**To:** Matt Leistico
**Subject:** FW: CB Hawk ICS System for Galena City Steam Plant
**Attachments:** quote automation & UG 9-5-08.pdf; HICS ROI 9-5-08.pdf

Matt,
I began working with City of Galena in May 2008 on this project. An associate of mine here at Cole Industrial Dale Moser (no longer with Cole Industrial) visited Walt Wilcox in Summer 2008 and then provided a quote to Walt in September 2008 for Boiler Controls Upgrade & automation of the boilers. Since then I've been working with previous City-Manager Walt Wilcox (deceased January 2009), Utilities Manager Dave Humphries (August/September of 2009) and then with Gary Thurmond (Boiler Plant Operator) December 2009.

This email provides information & answers to some of your current questions. In addition, see the 2 attachments

Regards,

Russel "Rusty" West
Alaska Sales Manager
Cole Industrial, Inc.
Office: 425-774-6602, ext 2139
Direct Line: 425-977-2139
Mobile: 206-909-3664
rwest@coleindust.com
-----Original Message-----
**From:** Russel West
**Sent:** Wednesday, December 09, 2009 9:00 AM
**To:** Gary Thurmond (garythurmond@yahoo.com)
**Cc:** Bryan Cole; Duane Rolkosky (drolkosky@cleaver-brooks.com)
**Subject:** Re: CB Hawk ICS System for Galena City Steam Plant

Hello Gary,

My name is Rusty West & I'm the Alaska Sales Manager for Cole Industrial, your Cleaver-Brooks representative. I worked previously with Walt Wilcox (in 2008), and then with Dave Humphries (earlier this year), on this project. Latest I heard from Dave Humphries (on 9-9-09) was that due to budget restraints the City of Galena probably won't pursue this in the near future, but possibly pursue a federal or state grant for funding.

Regarding your questions:

- Cole Industrial must do the installation of the Hawk ICS Systems. (An electrician will need to be available as well to run some main circuits)
- We sell the entire installed Hawk ICS system (not just the components) as it is a system that Cole Industrial needs to install (not an electrician, etc)
- For budgeting purposes you can estimate $292,000 for the entire scope as proposed earlier (10% higher that the price on the 9-5-08 quote)

For details on the Cleaver-Brooks Hawk ICS system we offered, see my 9-1-09 email below, along with the 2 attachments. Contact me as needed.

Regards,

Russel "Rusty" West

Alaska Sales Manager
Cole Industrial, Inc.
Office: 425-774-6602, ext 2139
Direct Line: 425-977-2139
Mobile: 206-909-3664
rwest@coleindust.com

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>>12-7-09
Dear Sirs,
I'm employed by the City of Galena, needing infor on the CB-Hawk ICS System. We have 3 Cleaver Brooks boilers, 400 hp each, 17,000,000 BTU's/hr, what would it take to install? Just a certified electician? What is the price to buy a CB-Hawk? Need to know ASAP!!!
Thanks for your time!

City of Galena Boiler Plant Operator,
Gary Thurmond
FAX: (907) 656-1769
garythurmond@yahoo.com

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-----Original Message-----
**From:** Russel West
**Sent:** Tuesday, September 01, 2009 12:06 PM
**To:** 'Dave Humphries (kilowatt@gci.net)'
**Cc:** Randy Cole; Bryan Cole; Mike Low
**Subject:** Energy Upgrades & Automation at Galena Steam Plant

Dave,
Good to chat with you today. As a summary of our conversation:

1. The attached quote for $266,288 was prepared by a previous employee of Cole Industrial (no longer with Cole Industrial) & is one year old. It has expired & is not currently valid. But, it is a good starting point. It lists the automation feature (having the 3 boilers at the Steam Plant each to get an automated steam valve & then monitoring/controlling of the boilers by the Master Panel located 3 miles away at the Power Plant), as well as 3 CB Hawk ICS energy upgrades to the boilers.
2. The CB Hawk ICS energy upgrades to your three (3) existing 500 HP Cleaver-Brooks steam boilers include:
    a. O2 Trim which is estimated to save 1% annually on your fuel bill
    b. Parallel Positioning which is estimated to save 1.5% annually on your fuel bill
    c. VSD for the blower motor projected to save $17,506 annually on your electric bill
3. Note that the attached ROI sheet is also a year old & would need to be updated. The ROI numbers are run using only one boiler running, although the cost shown is for the controls upgrade for all three boilers. The total cost shown on the ROI sheet of $216,758 is less than the $266,288 on the quote due to the fact that the automated valves and Plant Master Panel are not included.
4. One additional energy upgrade not detailed on the attached quote nor on the ROI sheet, is the use of a boiler stack economizer on each boiler. This is another energy savings item that should be considered.

If the City of Galena wants to move forward on these enhancements we would need to send a Cole Industrial Technical Field Manager to your facility in order to ensure we provide you an accurate updated proposal for this project.

Please review the attachments & let me know what you think.

Regards,

Russel “Rusty” West
Alaska Sales Manager

Cole Industrial, Inc.
Office:  425-774-6602, ext 2139
Direct Line:  425-977-2139
Mobile:  206-909-3664
rwest@coleindust.com

COLE INDUSTRIAL, INC.
Lifetime Value Expert Support

Headquarters:
5924-203rd St. SW
Lynnwood, WA 98036
425-774-6602: Phone
425-775-2272: Fax

-Seattle
-Portland
-Yakima
-Medford
-Boise

**TO:** City of Galena
P.O. Box 149
Galena, AK, 99741
**ATTENTION:** Walt Wilcox
**TELEPHONE:** 907-656-1301
**FAX:**

**DATE:** 9/5/08
**QUOTE NO.:** 9815-DRM
**PROJECT:** **BOILER CONTROLS UPGRADE FOR AUTOMATIC BOILER OPERATION AND REMOTE MONITORING**

# PROPOSAL

In response to your request, we are pleased to offer the following:

## Problem Statement

The City of Galena currently operates a steam plant consisting of three Cleaver Brooks 500 HP oil fired boilers and one atmospheric DA tank. The boilers are rated at 150 PSIG and operate at 20 PSIG steam. The plant was designed and built for 24 hour per day attendance by a boiler operator. Due to the fully attended operation and the low pressure of steam delivered to the users, the boilers do not have stop-check valves in their steam connections to the main steam header. Instead, two manually operated stop valves are used. This means that, under current design, a boiler operator must open the stop valves to put a boiler on line.

Further, with one boiler operating, subsequent boiler(s) are kept in hot standby manually, by operating the related boiler controls to achieve proper standby temperature. If the lead boiler fails, the next hot boiler is manually started and connected to the load by opening the stop valves.

The City has voiced a desire to automate the above operation, with the ability to monitor the steam plant from the City's power plant. In addition, the City has asked for recommendations for energy conservation measures which could be obtained during the plant automation.

## Proposed Solution

This proposal offers a solution to the operation and monitoring issues above, as well as the energy conservation measures which can be achieved by the controls. The package consists of new combustion and burner management systems for each boiler, which can communicate

to the remote location for monitoring and supervisory control. In addition, as a part of the package we offer a new plant master controller for boiler lead / lag control, which also allows selection of hot standby boiler temperature, as well as the automatic firing of two or three boilers in unison if required. We also offer, as part of the package, the replacement of the existing boiler's first manual stop valves with automated high performance butterfly valves which will be automatically commanded to open when a boiler is directed to fire, thus eliminating the manual valve operation currently required.

Controls related energy conservation measures for boilers of this type, fall into three types: O2 Trim, which continuously monitors the excess O2 in the flue gas and trims the air / fuel ratio to achieve the ideal excess air for the burner, Parallel Positioning air / fuel ratio control, which eliminates the jackshaft and linkage inaccuracies, and VFD control of the blower motor, which saves electrical energy by running the forced draft fan at the speed required to deliver the correct volume of combustion air at all times without losing fan horsepower across the damper. All three of these measures are used in this proposal. An ROI calculation sheet is attached to show the relative merit of these measures. In running the ROI calculations, I used the controls cost only, with installation labor, and used a best estimate of boiler load over the year. Please note that the ROI numbers are run using only one boiler running, although the cost shown is for the controls upgrade for all three boilers.

The communications package for monitoring the steam plant in the Power House includes a new PC running Allen Bradley RS View software communicating to the Master Panel in the steam plant. This communications link is Ethernet IP. Your local phone or communications people should be able to help you with the link. The application is already loaded on the PC. Our technicians will train you in the use of the system on site.

All of the new control system components and systems, except the new automatic stop valves, are manufactured by Cleaver Brooks and are built for your boilers. The system description is as follows:

<u>Boiler Control and Burner Management System CB HAWK ICS:</u>
A totally integrated pre-configured Allen Bradley CompactLogix PLC based boiler control system featuring independent burner management to comply with the requirements of NFPA 85. This advanced safety and control system features a 10" full color touchscreen HMI. Burner management is accomplished through CB780 integrated controller with UV scanner and amplifier with all information and functions available on the HMI.

Burner management shall provide:

- Automatic sequencing of the boiler through standby, pre-purge, pilot flame establishing period, main flame establishing period, run and post purge
- Flame proving and lockout on flame failure during pilot flame proving, main flame proving, or run
- Low fire damper/valve position for flame ignition trials
- Full modulating control of fuel and combustion air
- Utilize solid state controls and sensors to provide various control functions

Boiler Control functions include but are not limited to:

- Modulating control algorithm shall be Proportional-Integral-Derivative (PID) type
- Two boiler lead-lag control based on PID algorithm and/or remote setpoint

- Thermal shock protection based on water temperature and setpoint
- Various high and low limit alarms and shutdowns
- Touch screen graphical operator interface and monitoring
- Manual control of the boiler-firing rate utilizing control screens on the HMI to increment and decrement the firing rate
- On screen real-time display of all connected process parameters, system alarms and faults, as well as the recommendation for troubleshooting fault conditions.
- Stack temperature safety switch
- Running boiler efficiency calculation and display

Options included in this proposal:

- Variable Speed Drive
- Parallel Positioning Control
- O2 Trim

The new automated stop valves are included in the proposal and will be installed and integrated into the system by our personnel.

**PRICE, Installed..... $266,288.00**
(Two Hundred Sixty Six Thousand Two Hundred Eighty Eight and 00/100 U.S. Dollars)

**ESTIMATED SHIPPING .. 12 WEEKS AFTER APPROVAL & RELEASE FOR FABRICATION**

We are also developing an offering, with ROI calculations, for feedwater economizers for your boilers. This proposal should be available in about a week. This equipment and installation does not impact the controls offering above, and could be done at a later date.

**PAYMENT TERMS (OAC):**
**25% Invoiced upon receipt of order**
**15% Invoiced upon issuance of submittals**
**15% Invoiced upon release for production**
**45% Invoiced upon readiness for shipment**
**All invoices due net 30 from issuance date**

**CLARIFICATIONS:**

1. **COLE INDUSTRIAL, INC TERMS AND CONDITIONS ARE ATTACHED.**
2. **SALES AND/OR USE TAX NOT INCLUDED IN ABOVE PRICING.**
3. **PRICE FIRM FOR 30 DAYS.**
4. All control wiring/conduit between boiler and remote devices will be PROVIDED BY OTHERS.
5. Water treatment chemical, fuel, and electricity required during commissioning process and after system is completed to be provided by others.
6. Supervision of boiler system operations during temporary heating use or permanent use is by others.
7. Equipment Submittals shall be manufactures standard, only.

Very Truly Yours,

**COLE INDUSTRIAL, INC.**

Dale R. Moser
Account Manager
Direct Dial Phone: 425-977-2313
Cell Phone: 206-963-4107
Email: dmoser@coleindust.com

## Cole Industrial, Inc. Terms and Conditions of Sale

Except as specifically modified by the typed or handwritten portions of this proposal on the face side, the proposal is subject to the following terms and conditions.

**ACCEPTANCE OF PROPOSAL**: By signing and returning a copy of this proposal or a purchase order to the Seller, the Buyer shall be deemed to have accepted this proposal and agreed to the terms and conditions set forth herein. Seller may not amend or revoke this proposal for a period of 30 days from date hereof. If Buyer's acceptance is not received within such a period, Seller may amend or revoke this proposal at any time. Buyer understands that Seller is an independent sales representative and does not own or manufacture any of the new equipment covered by this proposal. Thus, upon acceptance by Buyer, it is understood that Seller's obligations hereunder are subject to the further conditions that the manufacturer will promptly approve and requires any adjustments in the prices or terms hereof unacceptable to Buyer. Seller shall have the option to void this entire proposal or substitute comparable equipment at the same or lower prices as quoted herein. However, the right of substitution shall not apply when the proposal is made as part of a bid on a construction project whose specifications expressly require use of equipment made by a manufacturer who does not approve the sale.

**TERMS OF PAYMENT AND PRICES**: The standard terms of payment are 30 days (O.A.C) from the date of shipment of any equipment or completion of the performance from the date of shipment of any equipment. In some instances progress payments will be required. If sale consists of equipment and startup services, payment terms shall be Net 30 days from date of shipment regardless of whether or not field services have been completed. If partial shipments are made or several types of services to be performed, Buyer may be invoiced as such partial shipment is made or upon completion of each type of service performed. In addition to the purchase price, Buyer shall pay all shipping costs or, if by prior arrangement Seller is to advance such shipping costs, reimburse Seller for such costs, Buyer shall also pay excise, sales, uses or other taxes or duties which the Seller may be required to pay because of the sale, delivery or use of equipment or services covered hereby, unless Buyer timely provides Seller with a resale certificate or other document acceptable to the appropriate taxing agency establishing an exemption from such taxes or duties. If after acceptance of this proposal Buyer requests changes in the equipment or services to be rendered or delays progress of the manufacturer or delays shipment of the equipment, or the performance of such services later than the dates specified herein, the price therefore shall be appropriately increased.

**RETENTION:** No retentions shall be withheld by Buyer unless agreed upon as part of a progress payment schedule.

SHIPMENT: Unless otherwise specified, shipment of the equipment shall be FOB the place of manufacture of equipment. The Seller's responsibility for shipment shall cease and Buyer shall assume all risks of loss upon delivery to the transporting carrier. Any claims for shortages, delays or damages occurring thereafter shall be made by the Buyer directly to the transporting carrier. Any claims against the Seller for shortages in shipment shall be made written 15 days after receipt of shipment by Buyer.

**DELIVERY**: Seller will use its reasonable best efforts to cause shipment of equipment as scheduled, but all shipment dates are approximate only. Delays in delivery of equipment or the performance of services shall be excused when caused by strikes, lockouts, accidents, fire, acts of God, embargoes, or governmental action or any other cause beyond the reasonable control of the Seller or manufacturer/supplier, whether the same as or different from the instances therein specifically enumerated. If for some reasons, Seller or manufacturer/supplier is unable to ship within a reasonable time after the date scheduled, Seller may, at its option, cancel the agreement without liability, except for return of any amounts previously paid. In no event shall the Seller be responsible or incur any liability for an costs or damages or any nature sustained by Buyer due to any delay in delivery or failure to make delivery as scheduled due to circumstances beyond reasonable control.

**EQUIPMENT WARRANTY**: The Seller warrants that the equipment to be furnished pursuant to this proposal will conform to the description contained therein. However, the Seller does not warrant that any new equipment will be free of defects in design, material or workmanship and such equipment is sold subject to such warranties as are made by the manufacture/supplier for breach of any such manufacturer's supplier's warranty, any expense to be for Buyers account.

**SERVICE WARRANTY**: Seller warrants that all installation, start-up or other services to be performed by Seller as described in this proposal will be performed in a workmanlike manner and in accordance with the applicable laws and regulations. However, Buyer shall be responsible for obtaining any required permits or other governmental approvals required as a condition precedent to Seller's performance of such services. Such warranty hereunder shall extend for a period of 90 days after completion of such services. If several different types of services are to be performed, such 90-day period shall run from the completion date of each type of service. Any claimed deficiency in the matter in which such services are performed must be brought to Seller's attention in writing in such 90-day period. Upon lapse thereof without such claim being made, this warranty shall lapse. This warranty is limited to the repair or redoing without charge to Buyer of any defective or non-conforming services. At Seller's option, any warranty work will be performed only during regular working days. This warranty shall be inapplicable if the Buyer or any third party first attempts such repairs or redoing or if the

equipment involved has been tampered with, altered, abused, subjected to abnormal treatment or maintained and operated in accordance with the Seller's or manufacturer's instructions and applicable methods.

**DISCLAIMER:** THE FOREGOING IS IN LIEU OF ALL OTHER CLAIMS OR WARRANTIES, ORAL, EXPRESSED, OR IMPLIED, INCLUDING ANY WARRANTY OR MECHANT ABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHETHER BASED ON WARRANTY, TORY OR CONTRACT THEORIES, SELLER MAKES NO WARRANTIES WHATSOEVER, INCLUDING ANY WARRANTY OF MERCHANT-ABILITY OR FITNESS FOR A PARTICULAR PURPOSE. WITH ERSPECT TO USED EQUIPMENT, BUYER TAKES ANY USED EQUIPMENT "AS IS". Seller shall not be liable for any direct, special or consequential changes or loss to the Buyer or any third party as a result of defects in the equipment sold nor any damage to the equipment itself or caused by the equipment. Nor shall Seller be liable for any direct, special or consequential changes or loss to the Buyer or any third party as a result of any defective or non-conforming services performed hereunder.

**PATENT INFRINGEMENT:** Seller shall not be liable for any change, loss or expenses incurred by Buyer in the event of any suits the Buyer for an alleged infringement of any patent rights, covering equipment sold to buyer hereunder. However nothing herein shall be construed as relieving the manufacturer of such equipment from any responsibility it may have to the Buyer in connection with such a claim.

**SECURITY INTEREST**: Except in cases where payment of the purchase price has been guaranteed by the posting of an adequate bond benefiting the Seller and to secure payment of the purchase price. Buyer agrees that the Seller shall retain a security interest in the equipment until Buyer shall have paid in cash the full purchase price for all equipment sold and services performed hereunder. This security interest shall cover any proceeds of the equipment. Upon Seller's request, Buyer shall execute and deliver to Seller any financing statement or other documents requested by Seller reflecting its security interest. The equipment shall at all times be considered and remain the personal property. If full payment of the purchase price is not made when due, Buyer shall pay interest on the delinquent amount at the highest lawful contract rate, not to exceed 18% per annum, and all costs of collection, including reasonable attorney's fees. Such interest and costs shall be deemed secured by the foregoing security interest.

**INSURANCE:** So long as any portion of the purchase price remains unpaid, Buyer at its cost shall obtain insurance against loss or damage from all external causes, naming the Seller as an insured in an amount and form sufficient to protect the Seller's security interest in the equipment.

**APPLICABLE LAW:** The validity, performance and construction of the proposal shall be governed by the laws of the State of Washington.

AFFIRMATIVE ACTION**: On purchase orders of $10,000 or more, vendor or subcontractor shall comply with current affirmative action requirements for Disabled Veterans and Veterans of the Vietnam Era and for Handicapped workers as described in FAR 52.222-35 and 36 respectively.**

# ROI Savings Calculator

09-05-2008

**Customer: City of Galena**
**City: Galena**
**State/Province: AK**
**CB Rep: Cole Industrial, Inc.**
**Total Hardware Cost: $148,728.00**
**Total Labor Cost: $68,030.00**
**Total Cost: $216,758.00**
**Total Savings Before Rebate: $106,716.16**
**Rebate Potential: $0.00**
**Total Savings with Rebate: $106,716.16**
**Projected ROI: 2.0312 Years**

**Boiler Horse Power: 500**
**Average Input: 52%**
**Average Input Efficeiency: 81%**
**Projected Efficeiency with O2 Trim: 82%**
**Run Hours Per Year: 8760**
**Fuel Cost: $3.12 per Therm**
**Electric Cost: $0.440 Per KW Hour**

| Boiler Firing Rate | 0% | 20% | 40% | 60% | 80% | 100% |
|---|---|---|---|---|---|---|
| Percent of Year | 0 | 10 | 50 | 20 | 10 | 10 |

## O2 Trim Calculation

Average Horse Power Output: 260
Average BTU/Horse Power Output: 8,703,500.00
Projected Efficiency Gain: 1 %
Average BTU/Horse Input with No Trim: 10,745,061.73
Average BTU/Horse Input with Trim: 10,614,024.39
Annual Fuel Cost with No Trim: $2,936,754.31
Annual Fuel Cost with Trim: $2,900,940.23
Annual Projected Savings: $35,814.08

**These are estimated savings only. Cleaver-Brooks will not be responsible for an savings or failure to achieve the numbers in conjunction with this program.**

Cleaver-Brooks Inc.
07/07 CBROI V2.0

## Variable Speed Drive Calculation

Motor Horse Power: 10
Cost of KW per Hour: $0.440
Total KW Hours with No VSD: 53,860.61
Total KW Hours with VSD: 14,073.00
Average Operating Cost No VSD: $23,698.67
Average Operating Cost with VSD: $6,192.12
Annual Projected Savings: $17,506.55

## Parallel Positioning Calculation

Average Horse Power Output: 260
Average BTU/Horse Power Output: 8,703,500.00
Projected Gain: 1.5 %
Average BTU/Horse Input with No PP: 10,745,061.73
Average BTU/Horse Input with PP: 10,549,696.97
Annual Fuel Cost with No PP: $2,936,754.31
Annual Fuel Cost with PP: $2,883,358.78
Annual Projected Savings: $53,395.53
(Removal of Linkage - 0.5%, Improved Combustion - 0.5%, Increased Turndown - 0.5%)

# Appendix D - Photos


**Fig-1. Typ interior, alarm bell, Extinguisher.**


**Fig-2. Fire Alarm Panel**


**Fig-3. Boiler Panel**

**Fig-4. Daytank location**

**Fig-5. Generator**


**Fig-6. Switchgear**

**Fig-7. Boilers**

**Fig-8. Steam Header**

**Fig-9. Air opening, Ducting**

**Fig-10. Ceiling Detail**

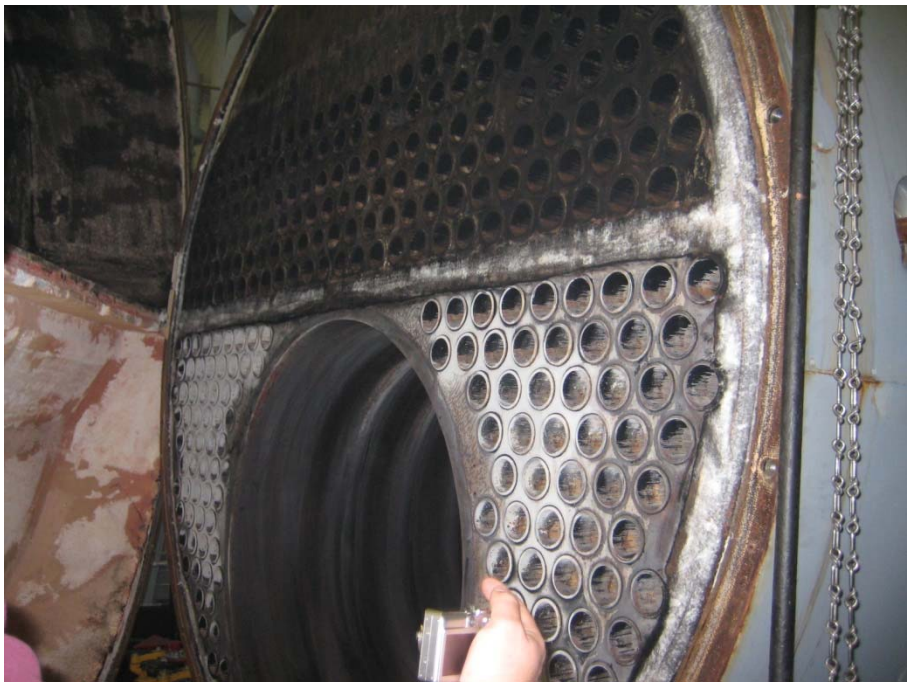

**Fig-11. Typical Boiler Tubes**


**Fig-12. Typical Boiler Face**

# Appendix E - Preliminary points list

**List of control points to be monitored (IN PROCESS)**

**Boiler System**

- ..
- ..
- ..

**Fuel System**

- ..
- ..
- ..

**Air System**

- ..
- ..
- ..

**Fire System**

- ..
- ..
- ..

**Building Status**

- ..
- ..
- ..

# Appendix F - Excerpt from FA report

Occupancy Classification

The original Occupancy Classification of the building is unknown.

Occupancy Classification and fire protection requirements for areas of the building:

| Building/ Area | Date Built | Occupancy Classification [1] | Description | Fire Protection Requirements | Existing Sprinklers |
|---|---|---|---|---|---|
| Boiler / Generator Rooms | 1968 | F-1 | Factory Group | Manual Fire Alarm System | No |

[1] Occupancy Classification and fire protection requirements based on IBC 2006 and how the building space is currently occupied.

Existing Fire Protection Features

The nearest fire hydrant is located approximately 110 feet off the east side of the building, across the street. Approximate location is shown on the city water utility drawing currently on file at the Headquarters Building in Galena. A preliminary review of the fire hydrants showed that they are within the required distance of all points on the building.

This building is currently protected by a Manual & Automatic Fire Alarm system. The building currently does not have an automatic sprinkler system.

Building Water Supply

The building water supply is located on the south wall in the boiler room, and is equipped with a 2-inch water meter. The existing service is likely not large enough to supply an automatic sprinkler system.

Automatic Sprinkler System Installation and Deficiencies

Currently no automatic sprinkler system is installed.

Fire Detection and Alarm System Installation and Deficiencies

1. Building 1499 has two separate Monaco Fire Alarm Control Panels (FACPs); one for the Steam Plant, and one for the Electric Plant.
2. The FACP covering the Electric Plant is located on the south wall inside the main hallway.

3. The FACP covering the Steam Plant is located on the north wall of the Steam plant.
4. The office area, switchgear room, hallway, exhaust room and generator rooms are protected with heat detectors.
5. The Steam Plant is covered by four ceiling-mounted heat detectors.
6. There are fire alarm bells mounted in the generator rooms. There are no notification devices mounted in the office area, the switchgear room, the exhaust room, or either hallway.
7. There is one wall-mounted fire alarm bell in the Steam Plant.
8. There is one manual pull station mounted within 5 feet of the west egress door.
9. There are manual pull stations mounted within five feet of most of the egress doors, except for the main entrance.
10. While manual pull stations were installed to the recommended heights as part of the original installation, the current ADA Standards for Accessible Design require that the operable part of the device be no more than 48 inches above finished floor. All of the manual pull stations are currently mounted at a height that puts the operable part of the device more than 48 inches above finished floor. The manual pull stations installed in this building vary in height, with some mounted as high as 65 inches.
11. In addition to the code deficiencies noted above, there are also upgrages that can be done to bring the current system up to the current industry standards.

Recommendations

Automatic Sprinkler System

Per current IBC code and the square footage of this building, an automatic sprinkler system is not required.

Fire Detection and Alarm System

The original installation appears to have met the design requirements for fire alarm and detection systems at the time of construction. The following changes are recommended to improve the building's fire detection and alarm capabilities to current standards:

1. Provide new notification appliances (horns and strobe devices) to meet NFPA requirements.
2. Correction of the height of pull stations within the facility.
3. The Monaco fire alarm systems have reached the end of their production life. Parts are generally available through third parties or can be reclaimed from demolished systems. It is highly recommended any upgrade include replacement of the control panels. It is also recommended that they be

replaced with one Fire Alarm Control Panel equipped to handle the detection and alarm requirements of both the Electric Plant and the Steam Plant sections of the building.

4. Provide new automatic detection devices (smoke and heat detectors) to meet NFPA requirements.
5. Consider inclusion of flame detectors for a quicker response to fires from the facility boilers.
6. Provide remote monitoring of alarm conditions as part of an overall campus system.

# Appendix G - Field notes from FA report

**Steam & Electrical Plant 1499**

| Steam & Electrical Plant 1499 | | | | No Fire Protection |
|---|---|---|---|---|
| **Room** | **Room Name** | **Floor** | **Photo Nos.** | **Notes** |
| | | | | |
| N/A | Entry Corridor | 1 | 1742 | 9' GWB, TYP |
| N/A | Main Office | 1 | 1743 | 8' 2X4, 9' GWB Above |
| N/A | Office | 1 | 1744 | 8' 2X4, 9' GWB Above |
| N/A | Laundry Area | 1 | 1745 | |
| N/A | Generator Room | 1 | 1746-54 | Roof Chicken Wire & Insulation, Exposed Ceiling, No Sprinklers, TYP, Storage |
| N/A | Corridor to Additional Gen. Room | 1 | 1760 | No Sprinklers, See Photo |
| N/A | Additional Generator Room | 1 | 1755-59 | |
| N/A | Switchgear Room | 1 | 1761 | |
| N/A | Boiler Room | 1 | 1762-74 | 2" Water Meter |


# GALENA CITY SCHOOL DISTRICT

GALENA, ALASKA 99741
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SUPERINTENDENT
Jim Smith

April 26, 2010

Governor Shawn Parnell
Box 110001
Juneau AK 99811-0001

Dear Governor Parnell,

Greetings from Galena! As you may recall from your recent visit to the Galena Interior Learning Academy, we are now serving Alaska students from over fifty communities statewide. As we seek to make our school more financially self sufficient we have turned to a number of engineered recommendations. At the top of our list is the Central Steam Plant Renovation and Improvement. This was funded by the Legislature at $990,000 in SB 230. These funds are to be matched by $260,000 in funds already on hand to complete the project. Annual savings once implemented will be $156,714 in fuel costs. This will then serve to extend out the useful life of the transition fuel provided by the Air Force at their departure by three to five years! This is critical to the health and growth of this regional learning center.

Governor, we know you have some difficult decisions ahead with the capital budget, but wanted to be sure you know what our project is about before making those tough calls. Thank you Governor, for your consideration regarding this matter.

Sincerely,

Jim Smith, Superintendent of Schools

Cc: Karen Rehfeld, Director OMB
Larry Ladoux, Commissioner of Education
Eddie Jeans, Director of School Finance
Kym Mauseth, Capital Budget Analyst, OMB